

AVIATION WEEK

A MCGRAW-HILL PUBLICATION

FEB. 13, 1950



Some commercial airports that have
installed or ordered
L-M high intensity runway lighting

BIRMINGHAM • BOSTON • CHATTANOOGA • CHICAGO
JACKSON • KNOXVILLE • MADISON, WIS. • MILWAUKEE
MINNEAPOLIS-ST. PAUL • NASHVILLE • NEWARK
NEW YORK International • NEW YORK (LaGuardia)
OKLAHOMA CITY • PHILADELPHIA International
PHOENIX • RALEIGH-DURHAM • ST. JOSEPH, MO.
ST. LOUIS • SALT LAKE CITY • WINSTON-SALEM
WORCESTER • AMSTERDAM • BRUSSELS • CANTON
DUBLIN • HANKOW • IRAN (Mehrabad) • PANAMA CITY
PARIS (Orly) • RINNEANA • SHANGHAI

LINE MATERIAL lights more runways

*than do all other
high intensity runway lighting
systems combined*

As the pioneer in High Intensity Runway Lighting, L-M is the recognized leader, both in the quality of its equipment and in the number of major airports using this equipment. The units provide the very high intensity of 180,000 beam candlepower without glare to the pilot.

Not so spectacular but equally important is L-M Medium Intensity lighting for smaller airports and secondary runways and taxiways at large ports. These units may be purchased as part of L-M's complete airport lighting "package." This lighting is highly efficient, CAA approved, with complete control equipment, and costs as little as \$1 per foot of runway.

Also available: large and small rotating beacons, obstruction lights, control panels, and auxiliary equipment. Write for literature and full information on L-M's Airport Lighting Engineering. Ask the L-M Field Engineer or write Line Material, Airport Lighting Division, East Stroudsburg, Pennsylvania.



L-M Medium Intensity Runway Light, for small airports and secondary runways and taxiways at large airports. Part of L-M's complete line of Airport Lighting equipment.

LINE MATERIAL Airport Lighting

YOU CAN BE **SURE**... IF IT'S
Westinghouse



These leading U. S. Air Force **PENETRATORS**
are **POWERED** by Westinghouse

Being penetrators, these planes must carry out tactical missions deep into enemy territory. To provide the required fuel economy and dependability, Westinghouse J-34 turboprops have been chosen for their power plants.

Westinghouse is constantly striving for improvement in jet propulsion... to provide only the best for the United States armed forces it is privileged to serve.



Bicycle helps a bomber trim its weight

SHAVING pounds off the Boeing B-29 bicyclic landing gear helped the bomber reach its own lightest weight. The bicycle gear uses the new design B. F. Goodrich wheel and brake—lightest for its capacity yet developed.

The simple design of the Expander Tube brake could mean that the brake can be made lighter for a given amount of kinetic energy than any other brake. And millimeter pounds have been trimmed off by new weight-saving features.

The new B. F. Goodrich expander tube has a narrow cavity that operates with greater pressure and less fluid dis-

placement. The new spider-type frame is both lighter and stronger. A new kind of brake block permits the use of thinner blocks—with longer wear and increased economy. A new torque bar design further aids weight.

The wheels are light, strong, rugged, and durable. They are B. F. Goodrich extra high pressure, built to take 240 psi inflation.

Besides its light weight, the B. F. Goodrich assembly also offers lower maintenance cost—through less weight loss, fewer replacements and longer life. Most like the operation "feel",

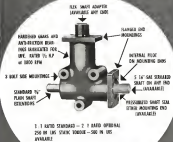
too. The brakes cannot lock or grab. They respond smoothly over the whole pressure range. They take heavy over loads better in emergencies.

Today's model is to B. F. Goodrich assemblies. They have special advantages for airlines and personal planes as well as military aircraft. Get full information from BFG engineers by writing to The B. F. Goodrich Company, Aeronautical Division, Akron, Ohio.

B.F. Goodrich
FIRST IN RUBBER

the new

ANGear



STANDARDIZED RIGHT ANGLE GEAR UNIT with UNIVERSAL MOUNTING

AIRBORNE

ACCESSORIES CORPORATION
 25 MONTGOMERY ST. • HILLSIDE 5, NEW JERSEY
 4926 MELROSE AVE. • HOLLYWOOD 38, CALIFORNIA
 W. H. WRIGHT • DALLAS, TEXAS
 The Ontario HUBBES OWENS CO. LTD. • OTTAWA, CANADA

AVIATION CALENDAR

Feb. 14-15—Annual convention, Flight Engineers International Assn., Forest Hills Inn, New York City, N. Y.

Feb. 18-20—National Operators' Show, Conrad Conrad Palace, New York, N. Y.

Feb. 27—Mar. 1—Spring meeting, American Society for Testing Materials, Hotel Williams Falls, Pittsburgh.

Mar. 12—Louisiana Aviation Conference, Washington Young Hotel, Shreveport, La. 10:30-11:30 a.m., Shreveport Chamber of Commerce, chairman.

Mar. 12—NPTA conference on aviation and airport fuel problems, Hotel Savaris, Indianapolis.

Mar. 12-14—Annual Fourth Region non-scheduled airlines meeting and annual annual Agricultural Aviation Conference, Hotel Texas, Fort Worth.

Mar. 14-15—17th annual meeting, American Road Builders Assn., Netherlands Plaza Hotel, Cincinnati.

Mar. 16—Annual convention, Institute of Radio Engineers, Hotel Commodore, New York City.

Mar. 18-19—14th annual flight propulsion meeting, sponsored by the Institute of the Aeronautical Sciences, Carter Hotel, Cincinnati.

Mar. 21-21—National Plastics Exposition, sponsored by Society of the Plastics Industry, New York, Chicago.

Mar. 21-21—10th annual Inertial Systems, sponsored by the American Inertial Society and the Institute of the Aeronautical Sciences, New Franklin Hotel, Philadelphia.

Apr. 1-4—Engineering and Maintenance conference, Air Transport Assn., Hotel Continental, Kansas City.

Apr. 1-4—National Aviation Exposition, sponsored by the Chicago Technical Society Council, Stevens Hotel, Chicago.

Apr. 10-12—Annual convention, American Society of Lubrication Engineers, Hotel Drake, Detroit.

Apr. 16-20—Annual Invention meeting, American Assn. of Airport Executives, Neil House Hotel, Columbus, Ohio.

Apr. 17-19—1950 symposium meeting, Society of Automotive Engineers Hotel Statler, New York City.

Apr. 24-26—Airport Operations Council, first annual meeting, Hotel Carter, Cleveland.

May 16-18—Midwestern symposium on fuel systems and the national meeting of the American Physical Society, fuel systems division, University of Illinois, Urbana.

June 30-15—National Aeronautics Assn., annual convention, Hotel Statler, St. Louis Mo.

June 18-25—March-May 1950 association, Ft. Clark Coast Ranch, Buckleberry Tex.

June 25-18—51st annual meeting, American Society for Testing Materials, north or south of meeting, sponsored and related equipment, Chalmers-Halloran Hall, At Home City, N. Y.

July 18—17th National Sporting Council, Conrad Palace, New York.

PICTURE CREDITS

11—Courtesy, 11—12—13—14—15—16—17—18—19—20—21—22—23—24—25—26—27—28—29—30—31—32—33—34—35—36—37—38—39—40—41—42—43—44—45—46—47—48—49—50—51—52—53—54—55—56—57—58—59—60—61—62—63—64—65—66—67—68—69—70—71—72—73—74—75—76—77—78—79—80—81—82—83—84—85—86—87—88—89—90—91—92—93—94—95—96—97—98—99—100—101—102—103—104—105—106—107—108—109—110—111—112—113—114—115—116—117—118—119—120—121—122—123—124—125—126—127—128—129—130—131—132—133—134—135—136—137—138—139—140—141—142—143—144—145—146—147—148—149—150—151—152—153—154—155—156—157—158—159—160—161—162—163—164—165—166—167—168—169—170—171—172—173—174—175—176—177—178—179—180—181—182—183—184—185—186—187—188—189—190—191—192—193—194—195—196—197—198—199—200—201—202—203—204—205—206—207—208—209—210—211—212—213—214—215—216—217—218—219—220—221—222—223—224—225—226—227—228—229—230—231—232—233—234—235—236—237—238—239—240—241—242—243—244—245—246—247—248—249—250—251—252—253—254—255—256—257—258—259—260—261—262—263—264—265—266—267—268—269—270—271—272—273—274—275—276—277—278—279—280—281—282—283—284—285—286—287—288—289—290—291—292—293—294—295—296—297—298—299—300—301—302—303—304—305—306—307—308—309—310—311—312—313—314—315—316—317—318—319—320—321—322—323—324—325—326—327—328—329—330—331—332—333—334—335—336—337—338—339—340—341—342—343—344—345—346—347—348—349—350—351—352—353—354—355—356—357—358—359—360—361—362—363—364—365—366—367—368—369—370—371—372—373—374—375—376—377—378—379—380—381—382—383—384—385—386—387—388—389—390—391—392—393—394—395—396—397—398—399—400—401—402—403—404—405—406—407—408—409—410—411—412—413—414—415—416—417—418—419—420—421—422—423—424—425—426—427—428—429—430—431—432—433—434—435—436—437—438—439—440—441—442—443—444—445—446—447—448—449—450—451—452—453—454—455—456—457—458—459—460—461—462—463—464—465—466—467—468—469—470—471—472—473—474—475—476—477—478—479—480—481—482—483—484—485—486—487—488—489—490—491—492—493—494—495—496—497—498—499—500—501—502—503—504—505—506—507—508—509—510—511—512—513—514—515—516—517—518—519—520—521—522—523—524—525—526—527—528—529—530—531—532—533—534—535—536—537—538—539—540—541—542—543—544—545—546—547—548—549—550—551—552—553—554—555—556—557—558—559—560—561—562—563—564—565—566—567—568—569—570—571—572—573—574—575—576—577—578—579—580—581—582—583—584—585—586—587—588—589—590—591—592—593—594—595—596—597—598—599—600—601—602—603—604—605—606—607—608—609—610—611—612—613—614—615—616—617—618—619—620—621—622—623—624—625—626—627—628—629—630—631—632—633—634—635—636—637—638—639—640—641—642—643—644—645—646—647—648—649—650—651—652—653—654—655—656—657—658—659—660—661—662—663—664—665—666—667—668—669—670—671—672—673—674—675—676—677—678—679—680—681—682—683—684—685—686—687—688—689—690—691—692—693—694—695—696—697—698—699—700—701—702—703—704—705—706—707—708—709—710—711—712—713—714—715—716—717—718—719—720—721—722—723—724—725—726—727—728—729—730—731—732—733—734—735—736—737—738—739—740—741—742—743—744—745—746—747—748—749—750—751—752—753—754—755—756—757—758—759—760—761—762—763—764—765—766—767—768—769—770—771—772—773—774—775—776—777—778—779—780—781—782—783—784—785—786—787—788—789—790—791—792—793—794—795—796—797—798—799—800—801—802—803—804—805—806—807—808—809—810—811—812—813—814—815—816—817—818—819—820—821—822—823—824—825—826—827—828—829—830—831—832—833—834—835—836—837—838—839—840—841—842—843—844—845—846—847—848—849—850—851—852—853—854—855—856—857—858—859—860—861—862—863—864—865—866—867—868—869—870—871—872—873—874—875—876—877—878—879—880—881—882—883—884—885—886—887—888—889—890—891—892—893—894—895—896—897—898—899—900—901—902—903—904—905—906—907—908—909—910—911—912—913—914—915—916—917—918—919—920—921—922—923—924—925—926—927—928—929—930—931—932—933—934—935—936—937—938—939—940—941—942—943—944—945—946—947—948—949—950—951—952—953—954—955—956—957—958—959—960—961—962—963—964—965—966—967—968—969—970—971—972—973—974—975—976—977—978—979—980—981—982—983—984—985—986—987—988—989—990—991—992—993—994—995—996—997—998—999—1000—1001—1002—1003—1004—1005—1006—1007—1008—1009—1010—1011—1012—1013—1014—1015—1016—1017—1018—1019—1020—1021—1022—1023—1024—1025—1026—1027—1028—1029—1030—1031—1032—1033—1034—1035—1036—1037—1038—1039—1040—1041—1042—1043—1044—1045—1046—1047—1048—1049—1050—1051—1052—1053—1054—1055—1056—1057—1058—1059—1060—1061—1062—1063—1064—1065—1066—1067—1068—1069—1070—1071—1072—1073—1074—1075—1076—1077—1078—1079—1080—1081—1082—1083—1084—1085—1086—1087—1088—1089—1090—1091—1092—1093—1094—1095—1096—1097—1098—1099—1100—1101—1102—1103—1104—1105—1106—1107—1108—1109—1110—1111—1112—1113—1114—1115—1116—1117—1118—1119—1120—1121—1122—1123—1124—1125—1126—1127—1128—1129—1130—1131—1132—1133—1134—1135—1136—1137—1138—1139—1140—1141—1142—1143—1144—1145—1146—1147—1148—1149—1150—1151—1152—1153—1154—1155—1156—1157—1158—1159—1160—1161—1162—1163—1164—1165—1166—1167—1168—1169—1170—1171—1172—1173—1174—1175—1176—1177—1178—1179—1180—1181—1182—1183—1184—1185—1186—1187—1188—1189—1190—1191—1192—1193—1194—1195—1196—1197—1198—1199—1200—1201—1202—1203—1204—1205—1206—1207—1208—1209—1210—1211—1212—1213—1214—1215—1216—1217—1218—1219—1220—1221—1222—1223—1224—1225—122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T-38 ENGINES will give the ConvairLiner longer, smoother flights, less drag, less weight, greater speed and more payload.

First U. S. Turboprop Transport Near

General Motors to finance installation of T-38 engines in Convair due to fly in June.

By Alexander McFarley

General Motors Corp. last week contracted its big land-based and moved with catalytic effect into the static U.S. jet transport prototype program, as a result, the first American turboprop transport plane will be flying in June—a cargo version ConvairLiner converted from conventional power to use two Allison T-38 turboprop engines developing 2778 equivalent shaft hp each and burning new design three-blade Aero products propellers.

Expenditures on the immediate GM-Convair program, estimated around \$1.5 million, are expected to have a strong effect in getting other American transport plane makers to go into active. Lockheed, Douglas, Boeing and Martin are all known to have jet transport designs on the drawing boards. It is probable that two or even three will be selected for actual prototype construction very soon, if some are not already under way.

► **Convair Constellation**—The two General Motors divisions, Allison and Aero products, will bear the principal responsibility of the GM-Convair program, and furnish the engines and propellers and engine controls. The larger engine division is the major investor. Convair has contributed the engineering for the powerplant conversion, which is only slated at around \$200,000. Standard price for a ConvairLiner is \$495,000.

Effect of the turboprop transport project on the government sponsorship of new transport prototypes is not yet clear. Air Commanding General's proposal for a light touring program for prototypes, favored by government, under the prototypes were built by industry could fit the Allison-Convair plane into its schedule very nicely. "The AEC proposal however has not been approved by President Truman's Budget

Bureau and is expected to be awarded and released for a second Budget authorization within a few weeks.

► **Centennial**—GMA expects to certify the turboprop transport at San Diego under Northrop's GAA technical staff, but anticipates that Allison will have certified the T-38 conversion before the airplane flies. The engine manufacturer has not yet made final specifications for engine certification, but has already discussed it informally with GAA.

The airplane will be delivered to Allison at Indianapolis for another testing program after which it will be used as a demonstrator to other engine manufacturers, military services and airlines. It is expected that the airplane will be leased to various test wings for test operations over their own routes.

► **Top Level**—Negotiations in the GM-Convair deal reportedly went to the top level in both organizations, including participation by Alfred P. Slota, chairman of the GM board and Floyd J. O'Brien, chairman of the Convair board.

Observers say the arrangement is a good bargain for both parties. Some of

the other airborne makers were freshly evicted of Convair. The airborne company had not only managed to get another company to bear the main expense of testing a new powerplant version of its transport but had sold its airplane business.

► **Newell Statement**—Well aware of the delivery of the highly competitive transport airplane situation and of the fact that Convair's competition are also potential customers of Allison and Aero products, E. B. Newell, Allison general manager and GM vice president, pointed out that the Convair plane was modified based on a requirement for a turboprop transport which could be modified for turboprops in the shortest time and at minimum cost.

The Convair-Liner has more time to complete commercial operation than any other U.S. prototype two-engine transport, and thus offers the best opportunity for comparison of operations with piston and turboprop engines.

► **Available Data**—Newell also pointed out that the engineering data on the conversion and testing would be available promptly to other plane manufacturers.

In most advantages perhaps to see such information is Douglas, whose piston two-engine DC-6 is expected with four of the same Pratt and Whitney B-200 engines used in the Convair-Liner. Primarily the conversion to the DC-6 would involve adding pylons to that of the Convair-Liner.

► **Martin**—Prospect—Claro, L. Martin Co., an engine manufacturer on its 2402 twin-engine transport, might possibly consider a T-38 conversion in 1980, in service, and probably will share the turboprop certification as an alternate powerplant for its new proposed 2404 twin engine transport which it is negotiating to sell to TWA and Western Airlines.

The engine manufacturer has made preliminary engineering studies and offered advantages of the T-38 as a conversion on an out-of-the-piston plane, as well as, besides its own conversion from piston engine to turboprop, as well as to make the conversion at San Diego for potential airlines. Presumably all of this will wait until the prototype plane is flown and tested, with the new piston engine service a number of years under consideration. Convair engineers expect the manufacturers will later be able to provide a conversion kit, enabling an airline to make its own conversion from piston engine to turboprop, as well as to make the conversion at San Diego for potential airlines.

► **Weight Advantage**—An apparent weight advantage with the turboprop installation coupled with greatly decreased weight and reduced jet drag are obvious advantages of the conversion. The T-38 is 9.88 wings only 1225 lb. and a weight saving of approximately 2000 lb. is expected in the Convair-Liner by replacement of the 2400 lb. Pratt & Whitney engines. This is the equivalent of more than 10 passengers and baggage at standard airline figures or 100 additional miles of fuel.

However in engine cost, even the T-38 may actually cost for the piston-

Cohn Predicts

Convair President LaMotte T. Cohn last week predicted that "there" will be the 40-passenger ConvairLiner as a relatively short time can be converted to turboprop transport, as a result of the Allison T-38 turboprop development program.

More than 150 personnel at Convair-Liner are now being operated by 12 airlines and have flown over 1.1 billion passenger miles without a fatality, he pointed out, and many potential for turboprop conversions.

Cohn said that the turboprop transport fits "nicely into today's traffic pattern" with other popular diversion planes because of fuel economy adding the turboprop to "track" at airports it required with other planes, "a performance which past jet transport will be unable to match."

He said that the Convair-Liner was originally designed strictly to take the higher speeds of turboprop operation and for simple conversion from piston to turboprop engines.

engine Convair-Liner may be as much as 18 to 20 mph, it is expected, while higher speed and cruise power will permit operations at higher gross weights than are now possible.

► **Structural Problems**—Conversion and certification will entail some structural modification of the airplane, particularly in the landing gear and wing, because of the higher performance with the turboprops.

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AF Sees F-84s As B-36 Parasites

An F-84 is planning "parasitic" as a station of the new Republic F-84 Thunderbolt fighter under the wings of the B-36 bomber. This program reveals the idea of parasite fighters for the B-36 bomber is a revival of policy after the parasite was dismissed as an active Air Force project on the basis of experience with the McDonnell XP-58 Golden Jet fighter.

The use of the F-84, mounted vertically on the B-36, is a new approach to the problem of escort fighters in the 10,000 mile bomber. The 550 mile reconnaissance (1000 mile range) of the B-36 places an entirely different light on the problem by providing extensive operational time and distance for the parasite fighter. Externally cast dashes of the XP-58 (about 30 min.) severely restricted its combat usefulness.

► **Parasite**—Meaning the parasite fighters suspended from the B-36 wings completely avoids the major stumbling block in the idea to date: cramped dimensions of bomb bays. Re-arranging the structure of the XP-58 forced its designers to produce an airplane with highly satisfactory visibility and control characteristics, which extreme wing and tail modifications could not fix. New arrangements of internal structure, more conventionally arranged jet engines with all their advantages in thrust and control, are needed.

► **Parasite**—An active experimental test indicates the Air Force is still studying the tactical problems of sending an escorted B-36 bomber over enemy targets. Previous defense of such a unit was based more on security than on tactical advantage. No fighter in the world, even flown in its future aspect, will ever have a 10,000 mile range with current powerplants. Therefore, the B-36 was assigned to unescorted missions by unavoidable default of fighter escorts.

► **"Clear Way"**—Missions—Long, its range

15

1947 British aircraft industries reported plans and equipment worth \$68,161,195.40, in 1945 the figure was \$76,164,779.60.

SBAAC's figures included exports of both aircraft and military aircraft. Military exports included management of Western Union aircraft. Manufacture abroad of British types under license now tends to replace exports from Britain, SBAAC said, and that fact will influence future export figures.

Latest USAF Bid Awards

As National Command Announcement items indicate, the Air Force has awarded the latest bid awards, shown on this page. Requests for further information should be addressed to Contracting Officer, AFSC, Wright-Patterson AFB, Dayton, Ohio, or telephone MC2793372.

AIRCRAFT

For 1142 aircraft test facilities (10-451):
Wing & Hyde Co., Glenview, Ill. T., on a bid of \$14,000.

For 10,100 each engines (10-452):
Compassion (Chicago) (Chicago) Co., Los Angeles, Calif. T., on a bid of \$10,100.

For 10,100 each engines (10-453):
Richard Lead Co., Cincinnati, on a bid of \$10,100.

For 10,100 each engines (10-454):
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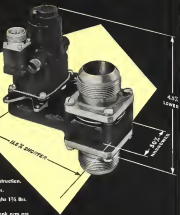
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MUCH LIGHTER...
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- All welded aluminum body construction.
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- Fully polished interior gate and crank arm on stainless steel. No wear.
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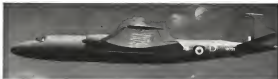


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AERONAUTICAL ENGINEERING



Design Analysis

Canberra: First British-Built Jet Bomber

Small size and short range of plane, while having little utility by U. S. standards, fit England's basic needs.

By Robert McLarson

The English Electric Co.'s Canberra jet bomber is uniquely British in that it has no true counterpart in the United States. Then, it is difficult to assess the plane in the light of U. S. tactical standards. To the British it is an "adaptor" aircraft and one quite probably well-suited to the peculiar needs of the Royal Air Force.

By U. S. standards, however, it is a medium "fish out of water" in that it is slightly too large for a fighter, slightly too small for even a "light" bomber.

It is the extremely of class that has led the Canberra to be hailed as "the lightest fighter," because it is smaller than a typical light bomber, and so "medium medium bomber" because it is larger than a typical U. S. fighter. For five years British discussion of the plane has proved misleading to American audiences.

Ground Comparison—The world's first jet bomber was the Douglas XB-43, which made its first test flight May 17, 1946 at Edwards AFB (Muroc), Calif. It is this early design that the Canberra resembles most closely in size, weight and performance, although differing widely in appearance.

The XB-43 was a development of the Douglas XA-42 (later XA-52) attack plane. By 1945 tactical standards, an airplane the size and weight of the XA-42 and the Canberra was classified as an attack or light bombardment type, but by modern U. S. tactical standards such a plane is too small for a light bomber.

In the fighter class, the Canberra most nearly approximates the Curtiss XP-57 Blackhawk and the Northrop P-60A, European two-man all-weather fighters.

Evidence that the Canberra size and weight more logically fall into the class comes from the report that English Electric is preparing an all-weather fighter version of the plane to be produced concurrently with the bomber version. Examination of its characteristics indicate that as an all-weather fighter the Canberra is a logical and superior development of the basic design.

Specifications Control—Evaluation of the Canberra as a bomber is a manifestation of the peculiar British tactical problem. The British Air Ministry has never been concerned seriously with the problem of range in the preparation of specifications for tactical aircraft, because of the proximity of Britain to possible continental targets.

A tactical radius of 400-500 mi. has always been adequate for British purposes in the design of fighters intended for continental operations, and the development of the British interceptors, with its endurance of one hour, was unique in power technology.

Much of this short-range thinking has been preserved in present British specifications, partly by choice, partly by the range problem of turbojet-powered aircraft. Therefore, the "beauty" of the Canberra is a consequence of the specifications and not, as is often stated, a consequence of the

Canberra Basic Data

General	
Type	Two-man, jet, 64 ft.
Length	47 ft., 5 in.
Height	15 ft., 2 in.
Track	15 ft., 5 in.
Wing	
Area, gross	560 sq. ft.
Aspect ratio	4.5
Spanned mean chord	15 ft.
Thickness chord ratio	12% at root to 9% at tip
Dihedral	2 deg. inner wing, 4 deg., 25 min., outer wing
Incidence	3 deg.
Stall speed	115 mph
Speed	470 mph, 27 ft., 45 in. 50 ft. and above sea level
Rate of climb	7,750 ft./min.
Dihedral	10 deg. on chord plane
Incidence	11 deg.
Altitude	41,000 ft., maximum -1 deg., 12 min.

English Electric designers, who have done an excellent job.

Low Aspect Ratio—The Canberra is an unique attempt to still the best advantages of light wing loading and low aspect ratio without suffering the adverse consequences of both. The well-known advantages of light wing loading is reducing takeoff run and increasing climb rate and ceiling are outweighed by high speed, which is necessarily traded with high wing

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the assumption that the mid-wing nacelle position is one of optimum drag.

Research in the country has indicated that this is not necessarily true and some nacelles, mounted in the low position below the wing, and properly faired, exhibit drag no greater than the mid-wing position.

The Caribena designers maintained the structural cost of this nacelle nacelle nearly by locating the engine wholly forward of the wing spar, thereby reducing necessary only a torque resistant.

►Fuel Storage—Single-pipe layout is used in the Caribena outer wing panels and aileron and flap loads are carried by light ribs. It seems strange that these outer panels were not set for fuel storage, and integral tanks could have been used with no structural penalty, although complexity of sealing, filling, venting, piping, etc., would have been added.

Fuel is stored mainly within the deck above the lower wing and it is reported that once that space is not fully filled, as the terminal section is stressed concerning this concern. It is reasonable to assume that the assumption of the Avco is approximately proportional to its power and, therefore, greater than most other turboprop engines. It follows that the fuel storage problem of the Caribena should have been of minor concern to its designers. Apparently, this was not so, leaving a large question mark as to the tactical range of the aircraft.

►Strut Attachment—One of the inequitable structural techniques used in the Caribena is the method of attaching ribs and struts in the wing.

A ribbed aileron-chord is inserted in the rib. A small eye-bolt is inserted into this fitting and turned at right angles to the plane of the rib. A screw is then inserted into the eye and through the aileron. English Electric is criticized almost for this inequitable method and has filed patents on the subject.

To U.S. engineers, however, the purpose of this arrangement is not too clear. It is obviously expensive, time consuming and even of the "band-aid" type of aircraft construction. Its purpose then, must be to strengthen it. It is doubtful that such an attachment can seriously seal the aileron and, in fact, may be a structural integrity.

►Deck Layout—Despite the claimed capacity of 10,000 lb. of bombs, the arrangement of the flight deck would seem to make some engineers regard loading prohibitive.

The pilot is located in the normal

position, but the only other crew member, a navigator, is situated behind him. There is no evidence of a bomb-aiming location in the forward portion of the craft. Area aft of the pilot's instrument panel, making it advisable for the second crew member to have an alternate station in the rear as a bombardier.

While bombing by radar is now the accepted method in strategic and heavy bombing, apparently it would not be intended for a machine of the sheer range of the Caribena.

As an all-weather fighter, however, the new arrangement is excellent, with the navigator's compartment spacious enough for the required display scopes. When it comes that existing Caribena may be converted, there is a suitable storage under the pilot's foot for about 2000 cubic inches and for retractable fuel tanks in the outer wing panel.

►Gear House—A truly modern development in the Caribena is the use of an auxiliary gear box to transmit drive to a system long advocated in this country but not yet used in practice. Each Avco engine has a single power takeoff which is routed around to an auxiliary gear box mounted in the wing leading edge.

Starboard has drives a generator, hydraulic pump and a compressor. Port has drives a generator, hydraulic pump and a cabin blower.

It seems odd that with two large air compressors available in the two turboprop engines that one would be made of separate blower for cabin air conditioning.

►Stability, Flap—The Caribena would make aileron aileron in a distinct contrast to U.S. practice in that the rear spar is oriented with the front spar. The U.S. in general usually attach the front spar to the wing structure change. Both Caribena and U.S. high-speed aircraft use elastic selection for the process.

An ironic feature of the Caribena is its wooden fuselage. Whereas U.S. designers utilize plastic skin, the Caribena is constructed of wood. Caribena designers went one step further and built the entire fuselage out of wood. It will be of interest to see how this structure holds up under various loads as to atmospheric erosion and as to electrical transparency.

►RAF Order—Three Caribena are now being and English Electric is in production on order for 12 service test aircraft for the Royal Air Force. Reports indicate that the RAF, as well as the Canadians, have broad production plans for the type in the near future.

It would appear, in general that the English Electric Caribena is an ex-

cellent airplane with unusually high performance, a high clearance of engine line and unusually smooth handling characteristics. It has particularly high altitude characteristics and is highly maneuverable at all speeds and altitudes.

However, on the loss of this

What a Spray Plane Should Have

Low-wing design, with better than 200 hp. and payload of 1250 lb., should replace makeshift agricultural craft.

By A. Howard Hoshack

Development of a suitable agricultural aircraft has not kept pace with increasing demand for safe and economic aerial dusting, spraying and seeding. Such a condition, however, is not unusual when one considers the problems faced in the development of the industry as a whole.

Twenty-eight years ago, when the plane first was used in experimental insect control, few effective poisons had been developed and little was known about their use. Introduction of the airplane into this field added new problems to the manufacturer and one of these proved most serious. Many problems involving weight, particle and droplet size, etc., have required constant consideration and effort.

In addition, development of suitable dispensing apparatus to handle properly the various materials has been a task of time, money and effort. As a result, the airplane was given little thought or attention so long as it could fulfill the basic operation of spreading the material at a normal rate.

Early plane use, too, naturally enough, was governed in great part by the initial price and operating expense of suitable aircraft. Hence, it was not unusual that many World War I surplus airplanes were used in the 1920s. But it must be recalled that one such airplane was made during that period to develop an airplane more suitable for the job.

Cooperating with the U. S. Bureau of Entomology, the Huff Deland Co. designed and built a number of dusting airplanes, some of which are still in use. Later on, in the '30s, as the demand for spraying and dusting increased and second hand commercial airplanes became scarce, new aircraft were designed. They were modified and became part of this growing industry.

Planes delivered at the present Hoshack, Bureau of Entomology, Department of Agriculture, Washington, D. C., Jan. 1-15, 1950.

Today, the aircraft would appear best exploited as a high altitude, short-range, two-man aircraft. In this connection, the maximum speed would fall slightly under that of the best U. S. designs at low and medium altitudes but would be definitely superior above 55,000 ft.

In the discussion of a proposed agricultural airplane, the author also suggests based on his personal experience. An active pilot for the past 18 years, he formerly was assigned to dusting and spraying and is one of the few who have mounted an inverted crank which destroyed the plane. He has given advanced design instructions and participated in flight test, aviation safety and design of dusting equipment. Presently, he is criticized in each major research.

Still later, after World War II, better and less expensive materials became available as a result of accelerated war research. That, plus the necessity of producing more food for ourselves and the rest of the world, further increased the demand for aerial dusting, spraying and seeding.

The additional aircraft needed to take care of this demand were obtained mostly from the stock of surplus ground airplanes between dropped on the market after the war.

►Accidents High—During these airplanes to treat millions of acres of farm land, swamp and forests, we have learned a sad and costly lesson in the past few years. In the six-year period ending in 1948, 973 pilots accrued fatal injuries and 77 were seriously injured in 727 accidents. Approximately 10 percent of the 1700-odd agricultural aircraft was destroyed.

Majority of these pilots actually or formerly were highly experienced, having had more than 5000 hr. flying time. That explains, perhaps, why the agricultural pilot has the dubious honor of being considered the most common cause of aviation accidents. They, however, why his percentage payment on \$7500 lb. insurance is approximately \$30 on each \$100 of earned salary.

►The Need—Obviously, something is fundamentally wrong with the plane now being used for agricultural work.

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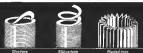
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These continued use, particularly in the face of a stepped-up demand for agricultural and military services, will virtually double the desired growth of the industry through preparation of high cost for their services and the maintenance aids to which the pilots are exposed.

With the exception of the airplane, however, we have everything we need to keep almost of the demand for such service. Proper materials, dispersing oil, grease and lubricants are in use as well, largely because of competitive efforts between various federal agencies will provide industry.

Now that we have a knowledge of the serious limitations of present agricultural aircraft, we need the same kind of cooperation to build a new airplane, specifically designed for safe and economic operation.

► **Craft Limitations**—Present agricultural aircraft have excellent payload to justify their cost of operation. Most have a type of construction which necessitates high costs for accident repair and for general maintenance.

Many are unsuited structurally for proper substitution of dispersing equipment.

These general design characteristics, according to incomplete experiments, may result in restricted work with and severe damage.

Presumably because these aircraft were not designed for the job and, in some cases, have insufficient power, they are not sufficiently maneuverable to operate safely in close quarters and still give safe landing and adequate coverage. Under heavily loaded conditions, they require, for safe operation, huge take-off areas necessitating long ferry legs from airports to other suitable fields.

Most important from a safety viewpoint is the fact that these aircraft give no virtually no designed protection for the pilot when accidents occur. And, arrangement of the cockpit is such that the pilot is seriously vulnerable to serious or fatal injury in accidents.

► **Flares Modified**—Admittedly, the choice of a specific design without these limitations is not as easy one. In an attempt to partially solve the problem, several high-pressure manufacturers have placed water-cooled aircraft on the market which are, in reality, modified versions of their personal type planes.

Records indicate, however, that these planes have not been a successful solution.

► **New Design Benefits**—Recent study and investigation confirms the opinion that an airplane can be designed and built which would be relatively free of the limitations mentioned. Its higher initial cost would be offset over a period of time by greater maintenance

expense materially recovered by greater business volume, longer service life, lower maintenance and repair costs, and reduced pilot insurance premiums.

In considering the following proposed design, it must be understood that agricultural flying will always be conducted somewhat haphazardly. Its inherent requirement of flying at its typically low altitudes and close to trees, buildings and electric wires will never permit work to be classified by its nature as comparable to the same occupational group in truck drivers, for example.

However, danger of fatal or serious injury can be reduced materially, with proper precaution reduction of insurance costs.

► **Features Desired**—It is proposed that a suitable and desirable airplane for agricultural use have the following features:

The craft would be a low wing design, powered with an engine of over 300 hp. It would operate effectively at 60 to 70 mph with a payload of 2150 lb. and would take off in a maximum of 1000 ft., loaded to gross weight.

The low wing is desirable for several reasons:

► It decreases the chance of accident by generating unobstructed pilot vision throughout an arc of 180 deg.

► Pilot safety is increased in serious accidents because of the wing impact absorbing, protective effect provided by proper design.

► It is believed that the low wing increases "downwash" effect relative to the working altitude of the airplane, thereby providing better coverage and penetration.

► Construction costs are less and field servicing is facilitated.

► **Bolting Wing Sections**—Wing, fuselage and tail sections would be all steel construction. Because of aircraft's resistance to fire and its elements and its wing-shearing qualities, maintenance costs would be reduced, pilot safety increased.

A desirable construction feature would be to have the wing composed of a number of bolted sections. This section could be attached to that aspect which is a multipiece, pull-out wing, would shut off the section without endangering the airplane into the ground.

In case of damage further rebound, the bolted sections would permit quick entry and emergency replacement.

Use of a high life metal is dictated by the requirements of good maintenance characteristics under maximum load conditions at relatively slow speeds. Alloys should be designed to permit a high rate of roll with low applied stress factor.

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Gilfillan's radar surveillance antenna (right), reaching through 160°, scans a radius 30 miles out and 10,000 feet up. Position of every aircraft in a 2,000 sq. mi. area is picked up and shown on the surveillance scope.



ant gasoline tanks could be used and located as the wings. In addition, an automatic type of air extrajugular could be utilized. To forestall possibility of power loss due to fuel pump failure, two approved gear-type pumps, as well as a hand-operated manual pump, could be installed in the cockpit.

► Landing Gear Factors—To facilitate rapid and accurate replacement, the main landing gear could be attached externally to the aircraft by bolts. Use of the spring steel type of landing gear, with its inherent high energy-absorbing characteristics, would contribute to the overall crash factor.

In locating the landing gear attachment points, it would be well to consider the possibility of dropping a gear that would minimize the chance of entanglement of the plane in brush too low over telephone or electric wires.

This problem, which has caused a number of fatal accidents, might possibly be solved by attachment of the gear upper ends to the fuselage at a point well forward of the wheel center line. Rounding inward slant of the spring steel legs would tend to deflect the wire downward and away from the landing gear.

If this is impractical, the installation of slanted, lead-edge guards ahead of the gear legs might be the answer.

► Vision, Protection—Optimum cockpit, of utmost importance for safety, could be further enhanced through use of a flat canopy and by placing the pilot relatively high in the deep fuselage and slightly forward of the wing center of lift position.

For protection in an inverted crash or rollover, a large, inverted, spoon-shaped plate could be installed above the open cockpit. Area of the plate should be sufficiently ample to prevent striking any soft, freshly-plowed earth.

A shoulder-grip, windshield should be set sufficiently forward to be out of reach of the face and head and should be strong to hold down flat on the oval when at rest or not in use.

Forward fuselage structure and cockpit area should be designed with primary consideration of pilot safety.

The cockpit structure should be strong enough to resist collapse from impact loads imposed in normal operation.

All sharp edges, including the cockpit opening, should be well shielded.

An adjustable, rubber type pilot seat should be installed in use to resist the placement of aircraft under crash conditions at operating speeds.

The cockpit should be equipped with a 40 G rubber seat belt, shoulder bar

and inertia harness lock. It is also important that the holding or guide point of the harness be located in a position to prevent lateral movement of the pilot's shoulders during a crash.

► Protection—Out—Considering the possibility of faulty operation of the shoulder harness, or its misuse, it is important that the front cockpit area be accessible to the upper torso and head in case of trouble, headsets and other potentially lethal objects.

Instruments frequently observed during flight—speedometer, tachometer, clock, and oil pressure and temperature gauges—should be installed outside and ahead of the cockpit, possibly in a depressed section of the engine cowling.

Other instruments, handles and switches, with the exception of the throttle stick and gear valve, could be placed along the inside of the cockpit below elbow height.

Approved rubber type, adjustable rudder pedals should be used, because their strength and large area would afford additional protection for the pilot's feet and legs in a serious accident. For the same reason, the cockpit floor should be a metal-covered, waterproof plastic or some other puncture-resistant material.

► Hipper Tank Placement—Incorporation of a high-strength steel tube structure in the fuselage bottom underneath the engine and cockpit sections would be a desirable safety feature. And a similar floor fuselage bottom would aid in absorption of impact forces.

To obtain desirable takeoff and flight characteristics under varying load conditions, the largest tank could be installed so that its center coincides with that of the aircraft. Because of its size the logical place to install the tank is in the fuselage.

Placed below and behind the pilot's seat, this tank is well situated to absorb impact in the type of accident where the airplane strikes the ground in a flat attitude. Loading ports located on the upper side of the fuselage could serve as fuel ports.

► Tail Ducts—New fuselage and tail section would be of conventional streamlined design. Airplane suspension and drum brakes should be provided for ease of maintenance and cleaning operations.

A ballast tank, equipped with floats around the control tubes and cables and mounted in the fore passage of air, should be installed in the rear fuselage. This would permit dust or spray being blown inward into the cockpit.

All fixed, tail surfaces should be externally bolted to the fuselage for ease of replacement or repair. A struts-and-ropes type of construction thus would allow on the spot or away would facilitate use of soft, landing and takeoff areas.

A lead-edge guard for deflecting or cutting iceplanes and electric wires should be installed on or just ahead of the windshield assembly.

► Speed—One of the most difficult accomplishments, in the planning of a new agricultural airplane, is that of choosing an operating speed both suitable and desirable for pilot safety, engine maneuverability and economy of operation. The proposed 60 to 70 mph speed is the result of compromise.

Operation in the West, where acreage is large and generally free of obstructions, would prefer a higher speed.

Those in the South and East, sometimes confronted with plots as small as a football field and surrounded by trees and worn, need slower speeds and greater maneuverability.

Although 60 to 70 mph may seem slow when thinking of airplanes in general, it **is** fast slow in the case of agricultural flying, considering that a plane will pass over a plot the size of a football field in less than 4 sec at this speed.

Even at this relatively slow speed constant and fuel-line turning will be required of the pilot. But, because of the good visibility provided by this proposed design, necessity of pilot action indicates this speed is suitable for their work. And engineers agree that it is sufficient for the incorporation of dual flight characteristics.

► South Coverage—Because observation and study have indicated the possibility that dog characteristics of different aircraft may have varying effects on south fields and density, it would seem desirable to explore this matter further.

No one design will satisfy the demands of all operators and pilots, but it is felt that a truly improved agricultural airplane can be successfully designed and built along the lines proposed. Such an airplane would be a well-proved short demand providing better aerial direction, economy and loading service at lower cost and reduced pilot risk.



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Eklund TE 1

Finnland's latest contribution to light aircraft design is the TE 1, a single-engine airplane built of wood and fabric by T. Eklund, of Kuusisto.

Powered by a 20-hp Primus air-cooled engine mounted above the enclosed cockpit, this diminutive craft is reported to have a top speed of 87 mph at sea level and a 4-hr. cruising range. Its 24-hr. span can be reduced to a few feet by folding the high wing snugly against the 35-ft. fuselage (shown with brace in photo).

► Flyweight—The airplane has a high set tailplane and tricycle landing gear using 55x4-in. low pressure tires which can be manually actuated for water landings. The TE 1 weighs only 352 lb. empty and can carry a useful load of 245 lb. It cruises at 75 mph, lands at 45 mph, and has an initial rate of climb of 520 fpm. Wing loading is 9.9 lb./sq. ft.

It is intended to show in his baby airplane, Eklund plans to develop a four-place version.

Dutch Fuel Truck

The latest aviation development reported from Holland is a new fuel truck capable of supplying kerosene to jet aircraft at a rate exceeding 250 gpm.

The fuel truck, built by the Van Doorn Fabrieken, Dutch automobile plant in Eindhoven, has replaced three Gloster Meteor fighters with about 1000 gal of kerosene in 10 min., 23 sec.

For maximum speed and to prevent damage to aircraft services, hoses are carried over and under the aircraft by means of a pair of long, swinging arms. Quick working valves automatically stop the flow in case of leaks or block-



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FINANCIAL

Air Shares Help Trust Valuation

But National Aviation Corp., with exclusive industry holdings, has been making periodic shifts of interest.

Aviation shares have continued or resumed investment trust valuations which held in portfolios during 1949. This is evident by an examination of the annual reports issued by various trusts.

For the most part, general investment type trusts have refrained from increasing their commitments to aviation securities. Whether limited shifts have been made, together with cutting holdings, demonstrates a narrow conception of the basic trends influencing aviation fortunes. The fact remains that none of these general investment trusts has shown any substantial attitude in making timely adjustments in their aviation holdings to participate in significant price appreciation moves that have occurred in this group.

It is probable that the various uncertainty prevailing in the aviation industry, as compared with other industrial groups, have tended to act as a deterrent for investments among these general trusts. By the same token, the greater the uncertainty the more marked are the opportunities for profit.

Aviation Trusts—A number of trusts have specified and confined their investments exclusively to aviation securities. The largest in this category, and one which possesses a consistent sense of direction, is the National Aviation Corp., making its periodic shifts of particular interest.

As of Dec. 31, 1949, National Aviation's net assets were valued at \$7,459,547 or \$16.05 per share. This represents a marked improvement over the \$14.76 per share valuation as of Dec. 31, 1948, and an increase of \$174.48 shares as of Dec. 31, 1947. The year-end high point was attained at Dec. 31, 1945 when net assets aggregated \$28.80 per share.

Income producing qualities of aviation shares is highlighted by the \$11,797 received by National Aviation in the form of dividends and interest during 1949, as compared with \$551,533 for 1948. Losses from the sale of securities during last year amounted to \$55,616 as against \$307,231 the previous year. This resulted in a net profit of \$216,980 for 1949 as contrasted to a net loss of \$28,956 for 1945.

As of the 1949 year end, 47.2 percent of total investments were committed to

the aircraft and accessories group, 36.2 percent in the airlines, with the balance of 16.6 percent confined to cash and U. S. securities. This overall composition was little changed from that prevailing at the 1948 year end. Going back to the composition of industry investments as of Dec. 31, 1945, it is interesting to observe that at that time 55.5 percent was represented by the aircraft group, 30.5 percent by airline shares and the remaining 16 percent by cash.

Holdings Liquidated—During 1949, National Aviation completely liquidated its past holdings of 18,000 shares of Northwest Airlines preferred, 18,000 shares of Boeing, 10,000 shares of Curtiss-Wright common and 500 shares of Sperry. Replacements were first made by the sale of 300 shares of Curtiss-Wright "A," 900 shares of Grumman, 200 shares of Thompson Products, 500 shares of United Aircraft preferred and 300 shares of Air America World Airways.

During last year, entirely new one investments were made, represented by 15,000 shares of Consolidated Aircraft, 500 shares of TWA, 10,000 Hinkle Aircraft Service, Inc. "A" and 5000 shares of Resett Airlines. Other additions included 500 shares of General Hydroplane preferred, 10,000 shares of Lockheed, 10,000 shares of American Airlines common, 150 shares of American Airlines preferred and 100 shares of Delta Air Lines.

Giving effect to these adjustments, National Aviation's aircraft portfolio as of Dec. 31, 1949, was represented by the following: 21,000 Bell, 5000 Boeing, 15,000 Cessna, 4000 Curtiss-Wright "A," 7700 Douglas, 1300 General Hydroplane preferred, 15,000 Grumman, 25,000 Lockheed, 35,000 North American Aviation, 2800 Thompson Products, 16,100 United Aircraft common, and 1500 United Aircraft preferred.

Airlines Holdings—In the airline group, the largest commitment is 10,000 Air Express International Agency, 1000 Air Express International Agency securities, 20,000 American Airlines common, 11,000 American Airlines preferred, 15,000 Boeing, 15,000 Chicago & Southern, 1000 and voting trust certificate,

15,000 Delta, 40,000 Eastern, 10,000 Hinkle Aircraft Service "A," 10,000 Pan American Airways, 5000 Resett, 500 TWA and 5010 United Air Lines preferred.

For the last time since 1945, the 1949 year end market valuations of the portfolio held by National Aviation exceeded its cost. As of Dec. 31, 1949, the total market value of its aviation holdings were \$5,465,512.18 as against a total cost of \$5,056,861.27. The largest single asset investment was represented by 25,000 shares of Lockheed with a market valuation of \$521,000 followed by \$556,250 for Douglas. Each of these investments shows a material book profit over cost.

Among the airlines, the American Airlines preferred, with a market value of \$796,000, ranked first but was below the cost of \$820,517.69. The Eastern Airlines common showed a market valuation of \$590,000, making second, but reflecting a "paper" profit to the investment trust over the cost of \$491,934.05.

National Aviation's support for relatively new commercial ventures, such as Air Express International Agency, General Hydroplane, Hinkle Aircraft Service and Resett Airlines, is particularly noteworthy. Of this group, Air Express International Agency is the only one showing a severe deficit, having a market valuation of only \$5000 as against a cost of \$65,600.

Nevertheless, by concentrating these new aviation ventures at their inception, the trust has made a contribution in the best traditions of private enterprise.

Investment—While in terms of its industrial investment in each of these four situations National Aviation's commitment is a way and one, its support represented relatively insignificant to these companies when they needed such help. A very small percentage (less than 3 percent) of the trust's assets are exposed to these ventures, thus limiting any widespread loss as a result of their overvaluing. But these commitments can under possible market advances in various phases of the aeronautical field which otherwise would have remained dormant without such help.

As with all new projects, there is no assurance of a guaranteed success, in fact considerable risk is present. This is offset by the possibilities of better than average profits if these endeavors fulfill their original promise. This has the indirect risk of various capital under fire enterprise. Great strides in many industrial developments, originating from technological advances, have very often remained idle with promising efforts.

—Sally Altschul

The story of air power—
past, present and future
told by a man who both saw
and helped it come of age

Slipstream

THE AUTOBIOGRAPHY OF AN AIR CRAFTSMAN

by EUGENE E. WILSON

Formerly President of United Aircraft and Chairman of the Board of Governors of the Aeronautical Chamber of Commerce

HERE is an absorbing, first-hand story of the age of the airplane told by an aviator executive who played a varied role in its development. This is a vivid and comprehensive account of the men, machines and important events in the air world during the past quarter century. Franklin Roosevelt, Calvin Coolidge, Billy Mitchell, Charles Lindbergh, Igor Sikorsky, Eddie Rickenbacker, Juan Trippe, and James Forrestal are among some of the more important personalities with whom the author was in contact.



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NEW AVIATION PRODUCTS

Rejection Rate Found Instantly

Quality control indicator gives immediate tally of parts produced and those defective, for quick line check.

A new device to eliminate time lag in comparing production line reject rates has been developed by General Electric Co., Schenectady, N. Y.

Known as the "quality control indicator"—QCI, for short—the electric computer was demonstrated recently in New York City.

The indicator counts those produced and number rejected, showing on a meter whether the percentage of rejects is higher or lower than the acceptable level.

This reading may be obtained at any given moment. GE says this is important, since statistical analysis of production and rejection rates, "the old way" would point on chronically high rejection rate to go undetected for some time, causing manufacturing losses and slowing production while components fell below, or in some instances days, behind production.

The device may be used on any production line without addition of production or supervisory personnel, the manufacturer says, whether operation is by automatic or manual methods. Right now it is operating on GE refrigerator assembly lines in Erie, Pa. Officials there report as "by-product" a reduction in defective parts in the production line (initially, higher output for some number of parts handled) and "greatly reduced" scrap and rework costs.

The indicator was developed by the GE General Engineering and Consulting Laboratory for its Appliances and Merchandise department and is being marketed by the company's Special Products Division in Schenectady.

It consists of two units. One is the "indicator," and the other the "characteristic analyzer." The former counts units rejected, the latter counts the reject.

And a "quality" meter on the analyzer shows at a glance whether rejects are above or below the acceptable rate—ranging from zero to 10 percent—permitted on the basis of production experience. At Erie, a control and indicator panel shows reject levels for each of several characteristics checked by inspection.

The indicator uses various signaling devices, such as an electric eye or tally switch, to count the number of units



Calculating equipment for GE's new "quality control indicator" is on two lower levels. Needle on analyzer, below girl's hand, signals when production rejects exceed a predetermined level, set with dial on right. Total count on reject may be read through small openings at left. Bottom one contains dial for reading total number of units produced. Large lens on top contains manual production line and shows how inspection passes button to signal reject of an unit.

produced. When an inspector accepts a unit, he pushes a button that changes the reading on a meter on the front of each analyzer. When the reject level at an inspection station exceeds the predetermined rate, the needle on the analyzer moves from the green half of a scale to the red, indicating need for corrective action.

Dials on the analyzer indicate total number of manufactured articles inspected, in units, tens and hundreds. A dial on the analyzer shows the count on rejects. The device may be used at the end of a production run of 200 units.

Indicating equipment, GE points out, need not be near the production line but may be installed in supervisory office, as in the Erie setup. Either 115v, 60-cycle a.c. or 110v, d.c. will operate it.

Protects Batteries

"Anti Korros" compound, offered by Arcon Mfg. & Sales Corp., 451 10 Ave., New York 18, N. Y., is represented to remove and prevent corrosion on battery terminals, casings and lead-down clamps. When applied with brush or other applicator over corrosion, it dissolves this harmful formation by electrolytic action. One application restores efficiency from 6 to 12 months.

Finn states it is unnecessary to clean or disconnect battery terminals before using compound. Product especially has been tested and approved by the chemical testing laboratory of the Board of Transportation, City of New York.

Checks Alternators

Aircraft 400-cycle alternator test equipment produced by Genie Electronics, Inc., 416-118 St. Roadway, N. Y., is offered in two versions, the LB-2 and AA-1.

Genie model LB-1 is designed to load test 90-1w, three-phase, 400-cycle alternators, and provides uniformly variable reactive and resistive loads within unit's range to simulate actual aircraft installations. Reactive load can be varied from 0-45 1w, active power factor as low as .5, and resistive load can be varied from 0 to 60 1w, with power factor of better than 99 percent, according to Genie.

Model AA-1 is test fixture for use with the Genie 400 amp. generator test set and EL-121 and provides necessary circuit, instruments for load testing smaller aircraft alternators of the three-phase, three or four wire type with capacities to 12 kw, 115/250v and 300-1000 cycles per min. Also check single phase, three or four-wire type with capacities to 12 kw, 115/250v, and 300-1000 cycles. It will also check single-ended to provide complete function for testing conventional d.c. generators as well as newer alternators on brushcraft.

Swivel Joint

Rotary swivel joint, just offered by Bisco Mfg. Co., 1611 West Wacker Drive, Chicago 24, Ill., is designed to eliminate wedge action of ball against gasket, so that bearing tongue is almost completely dissipated.

Joint is said to perform without "locking" at extreme temperatures. Swivel mount of side flexibility reduces possibility of wear or breakage from side stress, according to Bisco.

Unit is available in 90 deg. angle and straight designs in 1/2 to 1-in. pipe sizes.



Right Angle Drive

Improved "ANGI gear" right angle gear drive offered by **Airborne Accessory Corp.**, 23 Montgomery St., Hillsdale 5, N. J., has been designed for universal mounting and now includes right-angle, shock mounting flange with integral pin on both ends of the bearing. This arrangement is in addition to "shock safe" mounting which is available on original model. Unit is further modified to permit 2 1/2 gear reduction as optional feature in addition to standard 1:1.

Stated to be adaptable for many applications where, in mechanical and durable right angle drive is needed, unit also can be used conveniently for "gear" applications on special tooling and similar jobs. Standard device is rated at 250 in. lb. static torque capacity or to transmit 4 hp at 1500 rpm continuous duty. Units also can be furnished with 500 in. lb. static torque rating.



Machine Timer

For automatic measurement of production operations, equipment left tests and other jobs when automatic control is required, **Industrial Timer Corp.**, Newark 1, N. J., offers "Random Recalling Timer" incorporating two individual timing units in single housing.

When timer units are set in respective time intervals required, each cycle of operation will follow the other continuously in regular sequence. For example, if two successive production operations require 4 and 2 sec. respectively for their completion, the timer dial of element controlling first operation will only activate whatever mechanism is necessary to bring its operation to an end, but will not immediately initiate second timing element so that 2 sec. operation. On completion of 2 sec. period, second element automatically "hands back" control to the first.

Timers are contained in portable metal housing, 1 1/4 x 9 x 7 in. Provided are two manual modelets into which the timing elements are plugged so that they control single cycle, double three lead relay. The contact output of this relay is waterproof, permitting application with either voltage and current necessary for test or production. Relay contacts are rated 25 amp at 115v ac, a standard switch.

On-off toggle switch, lead control switch and pilot lamp are integrated with other components in gas compact, portable assembly permitting easy operation. Compared with specially built timers, cost of this standardized equipment is very small, according to maker.



Rugged Couplings

For use in driving jet engine duct joints, pinning belt air motors and similar applications, use of V-band, quick-disconnect couplings developed by **Masuda Products Co., Inc.**, Inglewood, Calif., are designed to provide positive and secure rigid, high strength connections are required.

Available in three different designs—continuous, segmented, and ventilated (slotted) band types—couplings are rip-resistant to sustain lighter weight with great strength, and extensive dependability over wide temperature and pressure ranges. Suitable flanges to accommodate couplings can be designed with or added to tubing or ducts to be joined. Rigid sheet metal or machined flanges are said to be equally adaptable.



Speed Clips

Test clips, designed to permit rapid head-up of electrical leads used in testing assembly line products and for connecting experimental systems in lab experiments, are offered by **Gophels**, 2124 W. Madison St., Chicago, Ill. Clips can be inserted permanently on panel or, for one-time applications, can be secured temporarily.

Time wasted in attaching equipment and making wires is kept to minimum since no additional operation, such as opening jaws, is required. Electric leads simply are slipped on or out of spring clamps. Tension is adjusted by tightening hex nut that secures clips in panel. Two hex nuts are included with each clip for mounting purposes and wire attachment.

Should YOU Be Doing Business ... or More Business—with the U.S. Air Force?

You may realize a very gratifying volume of sales from a thoughtful reading of this message. On this premise, will you grant us a few minutes of your time?

THE 1950 SITUATION

All Washington developments point to a renewed determination to maintain the superiority of the U. S. Air Force throughout 1950. Manufacturers supplying Air Force material will not only continue their vital share to maintain security, but can expect active tangible rewards in the form of advantageous contracts. This applies to manufacturers of products of all descriptions, for, from pumps to propellers, from rivets to radar, from pipe-holders to precision chisels, every angle even of Air Force material is considered by the Air Materiel Command, Wright Field, Dayton.

So, business will be good for successful contractors. You may expect in 1950, however, greater determination to enhance efficiency in systems of supply, closer scrutiny of methods, a determination to secure the utmost in contributions to the military effort, in comparison for a tightened national budget. In the past, companies relying on ordinary sales methods to secure Wright Field business have fallen short because of the great size of the operation, the extremely advanced competition, the size of its production, and the rapid development of new material requirements. In 1950, you may be sure that, to analyze your full potential of Wright Field business, a special plan of campaign is needed. Information, personnel, skill, or even the services of a nearby district office, fail so that specialized field where knowledge based on everyday contact is required.

WHAT TO DO ABOUT IT. Many short compasses, having recognized this situation, contractors personnel (Dayton offices staffed with technical men through which they outside and service Wright Field business. In this way they maintain contact between their field and sales offices. The fact that a competent Dayton office then provides a valuable service by keeping Wright Field personnel in touch with industry's activities, by offering expeditious business service, and by being available

at all times to channel problems leading to Air Force requirements, is recognized by the Air Materiel Command. If this is your plan, we can only applaud your intention, for only through constant, experienced field contact can your goal be achieved. But, if you wish to develop Wright Field business—and at the establishment of a Dayton office and all that this entails appears insurmountable—then to prepare a prompt, effective alternative aimed at securing identical optimum results.

NIS—"Four Digits Office"—National Requirements Service now serves the "Dayton Office" of a number of highly respected firms doing business with the Air Materiel Command. By this, we mean that we literally function in departments of each prime company, growing contact and supplementing their regular engineering and sales departments with our specialized Wright Field knowledge.

NIS is an organization of former Wright Field engineers, which, approaching the interdependence of the nation's industrial and military systems, offers a business agency to direct industry the advantages of continuous personal representation at the "Procurement Center" of the United States Air Force. All field representatives employed by NIS are graduate engineers carefully chosen from their fields by virtue of their background, knowledge of the Air Materiel Command, and personal acquaintance.

These existing qualifications are accounted for our conception of the NIS function. For this, along to the limited capacity of the usual manufacturer's agent, our field representatives first analyze a client's facilities, policies, and potential business opportunities. Equipped with this knowledge, our representatives plan and execute a definite program of daily contacts for each client designed to make known to him where his business opportunities lie, what his customer's exact requirements are, how he may best pursue his business, and to secure fully satisfactory performance of all contracts obtained. The value of our specialized personnel's daily contact with the many sources of business at Wright Field can hardly be duplicated in any other way.

Obviously such a relationship as we offer can never be sealed upon without more extensive discussion. These would, of course, establish our bona fides, and then progress to an analysis of your products, potentials, and production methods. A further analysis of your sales problem, as related to the Air Materiel Command, would result in a plan aimed at full representation at Wright Field at a special department of your company, on a basis of representation to be agreed upon commensurate with the effort involved. We would be very happy to authorize a preliminary discussion by our representatives. Write or phone, and a representative will get in immediate touch with you.

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Unfair Freight-Getting Methods?

CAB looks into forwarder dealings of American on the West Coast, and Northwest's practices in the East.

Investigations to determine whether American Airlines and Northwest Airlines are engaging in unfair methods of competition in soliciting freight business have been launched by the Civil Aeronautics Board.

Acting under the receipt of informal complaints, CAB is looking into American's practices in San Francisco and Los Angeles, and NW's dealings at Minneapolis and New York.

Forwarder Pipe-Flight documents holding operating authority from CAB are believed to have brought the complaints against the certificated carrier allegedly illegal, severely. Reports regarding carrying lines' monotonously opposed CAB's decision of September 1948, which granted operating rights to air freight forwarders.

It is understood that other lines here, such as Northwest and Northwest are doing business with forwarders as consolidation in a manner which CAB might consider illegal.

Spice Customer-The Board's primary investigation indicates that American, in expanding its freight service from the San Francisco area, and with representatives of Airborne Freight and Freight Traffic Inc., an authorized freight forwarder, December, 1948, and offered to guarantee delivery of the freight at the moment of Airborne's flight) in return for the forwarder's commitment to utilize the services of all other carriers. After Airborne refused the offer, American established a direct cargo service from San Francisco, and flights in that area allegedly were not covered by American to form a non-stop organization (the Air Shippers and Airlines Inc.) for the purpose of considering their claims for payment to Eastern markets at bulk rates.

Meanwhile, American reportedly continued an allocation system under which the majority of available space for flower shipments was reserved for the Air Shippers and Airlines Inc., and highly profitable flower shipments handled by Airborne were on several occasions accepted only subject to the line.

Tuesday In Agent-Members of the non-profit group reportedly hired a contract with C. E. Reynolds, a trucker and decorated hero in this quest for the release of manifestly truck shipments under master airbills for transportation to Eastern markets. Contracts were also signed with various truckers at destination with the help of Reynolds and American, according to CAB.

Flower shipments reportedly have

been turned over to Reynolds by its divided members of the shippers and growers group, together with copies of shipping manifests listing the original consignee and ultimate consignee. Reynolds then is said to have retained as the manifest a post paid air freight charge based on American's bulk rates, preparing master airbills listing himself (acting as agent for the Air Shippers group) in consignee, and various truckers at delivery points as consignees.

American then reportedly accepted the consolidated shipments from Reynolds, charging its bulk rates rather than the higher individual shipment rates.

Los Angeles Deal-CAB and American apparently had accepted shipments from American Shippers, Inc., a proposed consolidation in Los Angeles, upon filing its bulk rates rather than the higher individual shipment rates. The Board indicated that acquisition and establishment of other shipping associations, including groups of still members in the San Francisco area, have been encouraged by American. And here, too, low bulk rates rather than individual shipment rates were charged.

Saying that the bulk rates may have been made available irregularly, CAB said the possibility that American has discriminated unfairly against other shippers not offered the lower tariff. If the practices are found to be illegal, American will be ordered to cease.

NWA Case-Northwest is being investigated for handling of its bulk freight rate individual shippers separately consolidated by its freight, a New York carrier and member of the same, and sent to Sterling, Birmingham, Minneapolis trucking company. CAB and representatives of NWA and the Pipe-Flight group have indicated individual shippers not offered the lower tariff.

Stating that the bulk rates may have been made available irregularly, CAB said the possibility that American has discriminated unfairly against other shippers not offered the lower tariff. If the practices are found to be illegal, American will be ordered to cease.

Stating that the bulk rates may have been made available irregularly, CAB said the possibility that American has discriminated unfairly against other shippers not offered the lower tariff. If the practices are found to be illegal, American will be ordered to cease.

Route Changes

British Overseas Airways Corp. has announced plans to discontinue its New York-Sydney service Mar 31 and to replace its mid-Atlantic run from London to Bermuda and Nassau via Lefkara and the Azores on Mar. 2, using Constellations.



SHOWN IN TAKEOFF, Handley Page will stop at 30 miles to and from New Zealand

Marathon on Demonstration Tour

Handley Page's 20-passenger four-engine feedliner starts 35,000-mi. junket to stir up sales interest.

(McGraw-Hill World News)

London-First Handley Page Marathon feederline off the production line has been sent on a 35,000-mile four-month demonstration tour to New Zealand, with stops enroute in Rome, Athens, Moscow, Baghdad, Bahrain, Karachi, Delhi, Calcutta, Bangkok, Singapore, Bombay, Dacca, Colombo, Ceylon, and Sydney. Returning, the plane will pause also at Rangoon, Baku, Beirut, Freetown, Mombasa, Rabat, Casablanca, Algiers, Tunis, Cairo, Suez, Port Said, Alexandria, and London.

The Marathon, a 20-passenger four-engine transport, originally designed by Miles Aircraft Ltd and taken over by Handley Page about 15 months ago. Forty of the Mark I series, powered by four Bristol-Clyde 1,000-hp piston engines, have been ordered by the Ministry of Supply, with seven earmarked for British Overseas Airways. Handley Page has also developed a modified design, to take two Armstrong-Whitely Merlin turbo-prop engines, which version they propose for the first time at the 1949 S.A.C. show at Farnborough.

After 14,000 miles in preparation for the 1400-mi. hop across the Tasman sea line Australia to New Zealand, extra long national hauler tests were flown. Flying trials for the new version are being handled by the Civil Aviation Commission and the Air Ministry.

Marathon prototype has recently returned from outlying transportation tests in Africa, revealing about 100 hr flying at 14,000 and 15,000.

Craft is designed to meet and exceed ICAO safety specifications, and to carry 3000 lb of freight, or 32 passengers and their baggage, for stages of 500 miles at a cruising speed of 160 to 210 mph VIF and flying class

version also have been proposed. With one engine, the Mark I will fly 415,000 (37,000,000), furnished on an 18-month transport. Production is expected to reach three aircraft a month early in 1950.

DC-6A, Super DC-3 CAA Tests Pushed

CAA certification flight testing of the Douglas DC-6A four-engine cargo transport is sojournally complete. And, weather permitting, flight tests should be completed within three weeks on the Super DC-3.

Approximately three hours of air work remained on the DC-6A early this month. Still unaccomplished were tests to determine landing distance and the deceleration portion of the airworthiness tests. Certification program has been interrupted several times by demonstration tour occasions by winter operations' interest in the DC-6A.

Tests completed to date on the Super DC-3 include all power plant revolution tests, engine calibration, stall speed determination and numerous maintenance tests. After flight tests are completed, another few weeks will be required to prepare performance data and accomplish final certification of the craft.

TAL Eateries, Too

Ready to renew the airline's largest contract for meals and baked aviation refreshments, Transwestern Air Lines President Orin Nelson shows promise of becoming a class restaurateur.

TAL plans to open restaurants at Wakefield and at the Landing Airs Experiment Station, Azusa, Calif. Now the Oakland Board of Port Commissioners has granted the company a year's lease to operate the Sky Train Restaurant at Oakland Municipal Airport.

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State Loses Fight

State Airlines, Charlotte, N. C., has lost its long court fight for leader status which the Civil Aeronautics Board granted to Piedmont Airlines, Winston-Salem, N. C., in April, 1947.

The Supreme Court, in a 6 to 2 decision, ruled that CAB can legally award routes to a company that did not apply for them specifically. State Airlines claimed it had applied for the Charlotte line in Ohio, Kentucky, West Virginia, Virginia and North Carolina which went awarded to Piedmont. The lower court ruled last April, the U. S. Court of Appeals for the District of Columbia upheld State's claim that CAB had no power to grant routes to a carrier that did not specifically request them. The lower court said that 1937 patch Presidential veto to amend, only one was on the routes finally awarded to Piedmont by CAB. Actually, the lower court decided the routes granted Piedmont closely paralleled the routes applied for by State Airlines.

While Piedmont did not act on all the routes awarded it, the company is entitled in its application a "first-come, first-served" basis. The lower court ruled that CAB might choose to make Piedmont bus lines operating its leader position since February, 1948.

SHORTLINES

► **Air Express-Shippers** totaled 5.6 million last year, down 12 percent from 1945. Weight of shipments in 1949 aggregated 70 million lb., and gross revenues amounted \$472 million. Average weight of parcels last year was 29.2 lb., and the average charge per shipment was \$4.36.

► **Air Express-Hot** signed routing package and cargo agreements with Airline as Airlines and American Overseas Airlines.

► **American**—Last year flew a record 3,353,750 passengers, 1,505,463,773 passenger miles, a gain of 16 percent over 1948. Average load factor rose from 68.4 percent in 1948 to 64.4 percent in 1949. Mail volume grew 10 percent, totaling 5,857,905 ton miles; express totaled 5,552,852 ton miles, up 1 percent, and freight 32,881,425 ton miles, a 41 percent increase over 1948. Cargo revenues during the year averaged over \$508,000 monthly.

► **Capital**—Has signed an air cargo agreement with Sky Airways. Contract transfer period will be Chicago, where they will share the same terminal facilities and coordinate their schedules. Feature of the pact is a provision that each company will receive 5 percent of the revenue gained by shipments on the other carrier's routes.

► **Civil Aeronautics Board**—With an eye to the future, the agency recently said some of its technical staff to attend an Air Force seminar on operations and maintenance of jet aircraft. Many facilities are yet to be prepared.

► **Delta**—Reports a \$708,887 operating profit and \$490,967 net profit after taxes in 1948, compared with \$545,635 net income in 1946. Passenger traffic increased 5 percent and freight 23 percent over 1946, both setting new records.

► **Golden North**—This Airlines irregular carrier at Pittsburgh has asked CAB for a certificate to extend its route to operate second-class passenger and cargo service from Pittsburgh, Pa., to Anchorage and Fairbanks via Seattle and Tacoma.

► **Hawai**—The Spanish national carrier hopes to begin regular Manila-New York service before April 1 and to begin Heli-York traffic.

► **Honey K. Irwin**—Has asked CAB for a certificate to operate regular routes between New York City, New Orleans, Miami, via Great Barrington and Pittsburgh, Mass., with frequency Ryan Norseman Agardline from 1 to 14, N. Y.

► **Pacific**—Northern Reports increase passenger miles and ton miles a percentage over 1948 and total ton miles

(jumped 20 percent). Cargo traffic fell below 1948 totals.

► **Pan American**—Has signed an inter-line cargo agreement with the Flying Tiger Line.

► **Sea Flight, Inc.**—Has been denied a CAB exemption to engage in special air charter service between Westchester County Airport, White Plains, N. Y., and southern western area.

► **Trans-Canada**—Has announced a proposed ticket purchase plan. Installment certificates in 500 denominations are issued at all TCA offices and yield 2 percent interest when applied to the purchase of air tickets. Certificates can be ordered at face value without interest at any time.

► **Transocean**—Safely transported 545-39 million in Turkish government gold from Japan to the U. S.

► **TWA**—Hopes to obtain its Boeing Stratojet by July 1.

► **Turkey**—Has been granted 60 cents a plane mile temporary mail pay for DC-3 operations until June 30 and 90 cents a plane mile thereafter. Carriage will get 40 cents a plane mile for feeder operations with single-engine (Boeing B-17) equipment until June 30, 35 cents between July 1 and Sept. 30, 30 cents between Oct. 1 and Dec. 31, and 25 cents thereafter.

CAB SCHEDULE

► **Feb. 21**—Hearing on Boston Air Express and National Airlines merger continues. (Continued 4110)

► **Feb. 22**—Hearings on TWA route certificate renewal. (Continued 4110)

► **Feb. 23**—Hearing on California Southern Airways proposed certificate of Air Service, Inc., Route transfer certificate issued at Miami Springs, Fla. (Continued 4110)

► **Feb. 24**—Hearings on Air Service, Inc. application for Mexico City, Mexico-Los Angeles route certificate. (Continued 4110)

► **Feb. 25**—Hearings on United Airlines mail route case. (Continued 4110)

► **Feb. 26**—Hearings on West Coast Airlines certificate renewal. (Continued 4110)

► **Feb. 27**—Hearings on CAB's enforcement of airline national service law. (Continued 4110)

► **Feb. 28**—Hearings on Frontier mail route case. (Continued 4110)

► **Mar. 1**—Hearings on North Atlantic route transfer case. (Continued 4110)

► **Mar. 2**—Hearings on National Airlines proposed certificate of Air Service, Inc. (Continued 4110)

► **Mar. 3**—Hearings on Trans-Canada Airways proposed certificate of Air Service, Inc. (Continued 4110)

► **Mar. 4**—Hearings on Trans-Canada Airways proposed certificate of Air Service, Inc. (Continued 4110)

► **Mar. 5**—Hearings on Trans-Canada Airways proposed certificate of Air Service, Inc. (Continued 4110)

► **Mar. 6**—Hearings on Trans-Canada Airways proposed certificate of Air Service, Inc. (Continued 4110)

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Allison Goes and Does It

General Motors Corporation's Allison division comes up with the bold decision to buy a commercial Convair Learjet, install two Allison T-38 turboprop engines, and test them thoroughly. Avianews' story from Washington reports Floyd Odum's Consolidated Value Aircraft Corp. is contributing \$200,000 in engineering work. GMC's Aeroproducts division will furnish propulsion.

This is a significant milestone in our aviation history. It is a happy event to those who were abandoning all hope for a leading role by the free enterprise system in jet or turboprop development in this country. It means we're finally off dead center and underway.

Allison is purchasing the transport with its own money. No loan from Washington. No Federal strings attached. Presumably it will make the tests at its own expense, and in its own way. No bureaucratic slow-down. We assume the objective is to prove the value of its engines and promote their sale for both military and commercial use.

This decision will give this country its first, long-awaited turbine-powered transport, and open the way to commercial orders for transport plane manufacturers. Highly successful tests mean spur military interest and exert the influence of public opinion on high government officials who have been so cold to the importance of a modern turbine-powered transport fleet to our national defense.

Allison's decision makes pleasant reading after all of the skepticism we have heard that industry can only leave such pioneering up to government financing because of the "prohibitive" costs involved.

It is especially pleasant reading so soon after it became known that the Budget Bureau—which raised the White House—had rejected a USAF proposal to finance transport and cargo prototype planes.

Now Allison and General Motors have decided to stick their necks out. It is unnecessary but interesting, nevertheless, to point out that General Motors Corporation epitomizes American "Big Business," the big bad wolf that is constantly being squeaked at with so much suspicion and alarm by those strapping at free enterprise.

Defenders of the General Motors type of business organization repeatedly have contended that a giant company depends upon its size and resources to launch and accomplish pioneering developments that benefit the country and its people.

Now, this admittedly is only the first step. It certainly concerns Allison and General Motors in nothing more than tests. But up to now who in industry has had the courage to go this far?

Someone must start the ball rolling. It is gratifying that this time it is business—not a bureau or a politically appointed committee—that is taking the initiative. It is also gratifying that it is one of America's industrial giants that is doing it.

At least two major companies are unwilling to sit back any longer and wait for "Uncle Sags" to make this first job for us.

We forecast that successful tests will inevitably force the White House, the Budget Bureau, and the National Defense Establishment to exercise a next transbush on their gossamer cold and clumsy attitude toward turbine transport development.

A big laurel to Allison and GMC, and to Convair for a strong assist.

Woolworth or Tiffany?

If we can judge from a few of the arguments we still read against lower air fares on air coaches we gather that some air executives have not learned up recently on their American transportation history.

The future too often is still being judged by the past. The past proves that the easier we make it to travel, the more Americans will move. You simply cannot arbitrarily allocate a static percentage of the national income to travel expenditures. Nor can air transportation intelligently estimate that it will continue to win only a slightly increasing fraction of the total travel dollar in competition with other transportation modes.

Air transportation can persuade millions who already travel to take to the air. More important, it can persuade other millions who travel little or none to get about by air.

From the long range point of view, air transport must make plans for getting millions to fly. Because these few passengers we now are worrying so much about being "diverted" from standard to coach coaches are small potatoes in comparison with the millions who have never flown at all, and won't until we make it easy and inexpensive for them to do so.

The automobile made it easy and economical to travel. Americans spent every minute anybody ever made as those only luncheon carriage days and abandoned the world with our mobility.

Let's quit limiting our future by our past. Take off the blinkers and pick up the balloons. There are millions of Americans who have never flown. They are our new customers. Air transportation can never expand to its rightful size and efficiency until it captures them. But it will take Woolworth's principles to do it, not Tiffany's.

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